

## Genus *Anarsia* Hübner (Lepidoptera, Gelechiidae) from Thailand, with Description of Nine New Species

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**Abstract** Fourteen species of the genus *Anarsia* are recognized from Thailand. Of them, 8 species <*spatulatana* sp. nov., *paraisogona* sp. nov., *ovula* sp. nov., *chiangmaiensis* sp. nov., *procera* sp. nov., *conica* sp. nov., *meiosis* sp. nov., and *lewvanichae* sp. nov.> are described as new to science, and another 6 species are newly known from Thailand. A key to species based on the male genitalia is provided, and illustrations of genitalia are given.

**Keywords** *Anarsia*, Gelechiidae, Lepidoptera, new species, Thailand.

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### INTRODUCTION

The genus *Anarsia* Zeller is one of the specialized group of Gelechiidae having well developed asymmetrical valvae with palmately modified scales in the male genitalia, and comprises more than 100 species worldwide (Meyrick, 1925; Gaede, 1937; Clarke, 1969; Ponomarenko, 1989; Park, 1991, 1994). In the Palaearctic and Oriental regions, Ponomarenko (1989) reviewed 5 species from Russia, Park (1991) 3 species from Korea, and Park (1994) recently reviewed 8 species from Taiwan, but no species has been reported from Thailand. The material dealt with in this paper are based on the recent collection of "The Natural History Museum", London, made by I. J. Kitching & A. Cotton (1988~1994) in Thailand. Some additional specimens were collected by the first author at the Khao-Yai National Park in 1990. This collecting trip was arranged by Dr. H. Kuroko who stayed in the Department of Agriculture, Bangkok, for few years, as a consultant, and Dr. Angoon Lewvanich of the department. The measurement of the length of forewings, wingspan, was made from the apex of left wing to that of right wing. All type specimens, except *lewvanichae* sp. nov., which on indefinite loan from Thailand, are deposited in The Natural History Museum, London.

## SYSTEMATICS

### **Key to species of the genus *Anarsia* based on the male genitalia**

1. Right valva with a narrow process (Figs 22, 33, 37, 42) ..... 2
  - Right valva without a narrow process (Figs 16, 20, 25, 29, 46, 54, 58) ..... 5
2. Process on right valva about 1/2 length of valva (Figs 33, 36) ..... *A. paraisogona* sp. nov.
  - Process on right valva shorter than 1/5 length of valva ..... 3
3. Aedeagus shorter than right valva ..... 4
  - Aedeagus longer than right valva (Figs 37, 41) ..... *A. ovula* sp. nov.
4. Process of uncus relatively narrow, digitate; distal part of left valva conic (Figs 21, 23)
  - ..... *A. tricornis* Meyrick
- Process of uncus relatively wide, more or less triangular; distal part of left valva rounded (Fig. 41)
  - ..... *A. chiangmaiensis* sp. nov.
5. Valva with shortly stalked palmate scales, common for *Anarsia*-group ..... 6
  - Valva with long stalked palmate scales (Figs 16, 27, 54, 58) ..... 9
6. Tegumen with long lateral lobes arising beyond basal 1/3 (Fig. 29) ..... *A. spatulatana* sp. nov.
  - Tegumen without such lateral lobes ..... 7
7. Right valva rather narrower towards apex; distal margin between socii not emarginate (Figs 24, 25)
  - ..... *A. phortica* Meyrick
- Right valva dilated towards apex; distal margin between socii heavily emarginate (Figs 20, 50) ..... 8
8. Left valva dilated towards base, with slightly rounded membranous lobe near basal 1/4 of ventral margin; narrow process longer than valva (Figs 46, 49) ..... *A. procera* sp. nov.
  - Left valva dilated towards apex, with bladder-like lobe near middle of ventral margin; narrow process shorter than valva (Figs 18-20) ..... *A. elongata* Park
9. Width of socii broader than distal part of tegumen (Figs 16, 26) ..... 10
  - Width of socii narrower than distal part of tegumen (Figs 57, 61) ..... 11
10. Left valva with a narrow process on ventral margin; aedeagus gently curved (Figs 16, 17)
  - ..... *A. didymopa* Meyrick
- Left valva without a narrow process; aedeagus almost straight (Figs 27, 28) ..... *A. patulella* (Walker)
11. Right valva shorter than left one, with a trapezoidal ventral plate; aedeagus curved at a right angles (Figs 54, 56) ..... *A. conica* sp. nov.
  - Right valva as long as left one, without a ventral plate; aedeagus gently curved (Figs 58, 60)
    - ..... *A. meiosis* sp. nov.

### **1. *Anarsia didymopa* Meyrick (Figs 1, 16, 17)**

Meyrick, 1916, Exotic Microlepidoptera, I: 583; Clarke, 1969: (6)242.

Type locality: Bengal, Pusa.

Wingspan, 9.0 mm in male. Since the species was described from India, based on a male, no female has been known to date.

*Material examined:* 1 ♂, NW Thailand, Chiang Mai, 15 km Samoeng/Hang Dong Rd, 750 m, 3. II. 1989 (I.J. Kitching & A. Cotton).

*Distribution:* Thailand (new record), India.

## 2. *Anarsia elongata* Park (Figs 2, 18-20)

Park, 1995, Tropical Lepidoptera, 6(1): 64.

Type locality: Taichung Co., Chingshan, Taiwan.

Wingspan, 14.0~15.0 mm. After Park (1995) described this species from Taiwan, it is known for the first time from Thailand.

*Material examined:* 1 ♂, N Thailand, 34.3 km Nan, Doi Phu Kha NP, 1640 m, 13. IX. 1990 (I.J. Kitching & A. Cotton); 1 ♂, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1460 m, 23. II. 1989 (I.J. Kitching & A. Cotton); 1 ♂, Thailand, Mae Hong Son, Pai Dist. Dai Maoya, 1240 m, 18. VII. 1990 (I.J. Kitching & A. Cotton).

*Distribution:* Thailand (new record), Taiwan.

## 3. *Anarsia patulella* (Walker) (Figs 3, 26-28)

Walker, 1864, List Lep. Het. Br. Mus., 29: 635 (*Gelechia*); Park, 1995: 61, figs. 21-24, 26.

Type locality: Ceylon (Sri Lanka).

Wingspan, 10.0~11.0 mm.

*Material examined:* 1 ♂, S Thailand, Khao-Yai, 20-24. VIII. 1990 (K.T. Park et A. Lewvanich); 1 ♀, ditto, 20-24. VIII. 1990 (K.T. Park et A. Lewvanich).

*Distribution:* Thailand (new record), India, Sri Lanka, Taiwan, Australia (Queensland).

The species is widely distributed in the Oriental and Australian regions.

## 4. *Anarsia phortica* Meyrick (Figs 4, 24, 25)

Meyrick, 1913, Journ. Bombay Nat. Hist. Soc., 22: 167; Clarke, 1969: (6)246.

Type locality: Dibidi, N. Coorg.

Wingspan, 13.0~15.0 mm. After the species was described from Sri Lanka and N India, it is reported newly from Thailand.

*Material examined:* 2 ♂, NW Thailand, 37 km Doi Inthanon NP, Checkpoint, 1700 m, 9-10. IX. 1988 (I.J. Kitching & A. Cotton).

*Distribution:* Thailand (new record), North India, Sri Lanka.

## 5. *Anarsia tricornis* Meyrick (Figs 5, 21-23)

Meyrick, 1913, Journ. Bombay Nat. Hist. Soc., 22: 168; Clarke, 1969: (6)250, fig. 2; Park, 1995: 64, figs. 29-33, 47.

Type locality: Maskeliya, Ceylon (Sri Lanka).

Wingspan, 11.0~14.0 mm. After the species was described from Sri Lanka, it was first reported from Taiwan and Indonesia by Park (1995). Recently two males which were collected from N India in the Caradja's collection at "Grigore Antipa" Museum, Bucharest, were also examined.

*Material examined:* 1♂, N Thailand, Chiang Mai, 15 km Samoeng/Hang Dong Rd., 750 m, 3. I. 1992 (I.J. Kitching & A. Cotton). 1♂, S Thailand, Khlong Nakha WS, Kam Puan substrn, 85 m, 27. XI. 1991 (I.J. Kitching & A. Cotton); 1(?) S Thailand, Yale, SE of Yala, Khao Beu Yaul, 340m, 3. XII. 1991 (I.J. Kitching & A. Cotton). Further specimens examined 2♂, Dajeeling, near Sikkim, N India, no collecting date and collector.

*Distribution:* Thailand (new record), Sri Lanka, N. India, Indonesia (Sumatra, N. Sulawesi), Taiwan.

#### 6. *Anarsia* sp. (Figs 14, 51, 52)

Wingspan, 11.5 mm. This species is probably conspecific to a new species which Mr. Ueda (pers. comm.) will describe newly from Japan. Its manuscript is being submitted to a Japanese journal and in printing now. Thus, herein specimens information is only given, without species name.

*Material examined.* 1♂, S Thailand, Khao-Yai, 20-24. VIII. 1990 (K.T. Park et A. Lewvanich), gen. prep. no. CIS-4240/Park; 1♀, S Thailand, 15.4 km, Sai Rung Waterfall Kho Banthad WS, 15 m, 9, VIII. 1990.(I.J. Kitching & A. Cotton), gen. prep. no. BM-28271/Park.

*Distribution.* Thailand, Japan(?)

#### 7. *Anarsia spatulatana* Park et Ponomarenko, sp. nov. (Figs 6, 7, 29-32, 63)

*Diagnosis.* In the pattern of the forewing the new species is not easily separable from *A. protensa* Park, except slightly narrower forewing and trapezoidal costal mark, instead of triangular one with rather pointed apex in the latter. However, it can be easily separated from the latter by the male genitalia: tegumen with a unique, spatulate lateral lobes; left valva inflated with a long process, and distal part of right valva quadrate. Female genitalia is very similar to that of *A. isogona* Park. The female genitalia of *A. protensa* which was illustrated by Park (1995) seems to be erroneously identified, and it is probably that of this new species or an allied species (per. comm. Ueda, 1996).

*Adult.* Wingspan, 17.0~18.0 mm. Head pale gray, suffused with brownish gray. Tegula with dark brown scales on anterior margin. Thorax concolorous. Antenna about 3/4, pale grayish orange with brown rings throughout. Ocellus absent. Labial palpus in male, 2nd segment subtrapezoidal, dark grayish-brown on outer surface, with creamy white scales on dorsoanterior margin broadly; 3rd segment in female, as long as 2nd, subbasal band narrow and dark brown, two broad dark-brown bands bordered by a white oblique line at middle part. Male lacking a tuft of long hairpencils on under surface of forewings. Forewing elongate, ground colour gray, costal margin gently incurved medially, then slightly arched beyond it; costal mark large, more or less trapezoidal, but female with rather acute lower apex, dark brown, reaching about 2/3 across wing (fig. 7); 1-2 small, almost triangular grayish-brown spots before and beyond it; apex relatively acute; cilia gray, especially long hairs beyond middle on posterior margin. Venation with  $R_4$  and  $R_5$  stalked beyond middle,  $R_5$  to costa. Hindwing pale gray; apex rather obtuse; cell closed.

*Male genitalia* (Figs 29-32). Uncus with hook-like process, narrow at base. Width of socii narrower

than distal part of tegumen; socii stretched caudally, with rather angular apexes. Tegumen evenly narrowed distally, with a long spatulate lobe at 1/3 of lateral margins. Valvae asymmetrical, with palmately modified scales bearing 10-14 lobes. Left valva oval, slightly inflated distally, with a long process, arising from near basal 1/4 and curved caudally. Costa of right valva almost straight, with a smoothly rounded medial lobe; ventral margin triangularly expanded with sharply acuted apex, and slightly emarginate beyond it; distal part almost quadrate, lacking process. Aedeagus curved dorsally, heavily sclerotized medially, strongly ankylosed with juxta and vinculum at 1/3, basal plate membranous with rounded margin. Vinculum relatively narrow.

*Female genitalia* (Fig. 63). Ovipositor relatively short, membrane between 8th and 9th segments about 1/3 length of papillae anales. Apophyses posteriores 3 times longer than apophyses anteriores. Eighth tergite with a small triangular pocket-like hollow on outer surface. Ostium placed asymmetrically, on left half of 8th sternite, with weakly sclerotized, trapezoidal plate posteriorly. Anterior margin of 8th sternite stretched to a long band-like plate, turning to right, accompanying with a large membranous pouch. Ductus bursae narrow, membranous, as long as corpus bursae; ductus seminalis arising from junction with corpus bursae. Corpus bursae relatively small, membranous, oblong; lacking signum.

*Types.* Holotype: male, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1380 m, 22. II. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28267/Park. Paratypes: 1 ♀, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1380 m, 30. I. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28268/Park; 1 ♀, NW Thailand, Chiang Mai, 15 km Samoeng/Hang Dong Rd, 750m, 3. II. 1989 (I.J. Kitching & A. Cotton).

*Distribution.* Thailand.

#### **8. *Anarsia paraisogona* Park et Ponomarenko, sp. nov. (Figs 8, 33-36, 62)**

*Diagnosis.* The new species is very similar to *A. isogona* Meyrick superficially, but it can be easily separated from the latter by the male and female genitalia: valvae with rounded apex, right valva with a long narrow process, and aedeagus arched in the male genitalia; female genitalia much further from the latter with a long ductus bursae, large corpus bursae and funnel-shaped signum, triangular ventral plate near posterior margin of 8th sternite, lacking a large membranous pouch stretched from anterior margin of 8th sternite.

*Adult.* Wingspan 10.0~11.0 mm. Head pale gray. Tegula concolorous, with dark brown scales on anterior margin. Labial palpus in female, 3rd segment longer than 2nd; 2nd segment grayish brown on outer surface, brownish orange speckling with dark brown on inner surface. Forewing elongate, relatively narrow; ground color pale gray, dark brown scales irregularly spreaded beyond costal mark; costa slightly incurved near middle; costal mark large, dark brown, lower apex not sharply acuted as in *isogona*, reaching about 3/5 across wing; a small triangular spot before it and 2 similar spots beyond it. Venation with  $R_4$  and  $R_5$  stalked near middle,  $R_5$  to costa,  $M_1$  close to  $R_{4,5}$  at base. Male lacking a tuft of long hairpencils on under surface of forewing. Undersurface of legs dark brown; hindtibia with pale orange hairlike setae above. Hindwing gray, more or less descaled before middle, anterior margin broadly expanded to middle; termen heavily oblique; apex relatively acute; cell closed; Venation with  $M_1$  arising from beyond cell,  $M_2$  far from  $M_3$  at base,  $CuA_1$  arising from before lower angle of cell.

*Male genitalia* (Figs 33-36). Uncus with relatively long, hook-like process; width of socii at medial part wider than distal part of tegumen, stretched laterocaudally. Tegumen broadened at base and slightly dilated near 6/7, narrower towards apex. Valvae asymmetrical with commonly modified scales bearing 10-12 lobes. Left valva more or less oval, inflated at base, with a membranous lobe ventrally on inner surface and a strongly bent process arising from near base; apex rounded. Right valva relatively narrow, slightly dilated at base and narrowed at middle, with a narrow and long process arising before middle, curving to left. Aedeagus arched, heavily ankylosed with juxta and vinculum by rectangular plate at basal 1/4. Vinculum relatively narrow.

*Female genitalia* (Fig. 62). Ovipositor relatively short, membrane between 8th and 9th segments not longer than 1/2 length of papillae anales, with a triangular sclerotized plate near posterior margin of 8th sternite distally. Apophyses posteriores as long as papillae anales. Apophyses anteriores weakly developed, forming a triangular plate. Posterior margin of 8th tergite convex medially, with a small triangular pocket-like sac. Eighth sternite with sinuous posterior margin, its ventral part more sclerotized. Ostium placed slightly at left side from middle of 8th sternite. Seventh sternite with broad, sclerotized zones medially at both sides, and with plicated sclerotization on posterior margin. Ductus bursae narrow, membranous, slightly dilated at middle part, about 2/3 length of corpus bursae. Corpus bursae membranous, extremely large, as long as ductus bursae; signum funnel-shaped, lateral margin serrated.

*Types.* Holotype: male, N Thailand, 8.5 km Pua to Doi Phu Kha NP, Nan, 450 m, 29. VII. 1990 (I.J. Kitching & A. Cotton), gen. prep. no. BM 28270/Park. Paratype: 1 ♀, S Thailand, 18.5 km Nan, 320 m, 25. VII. 1990 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28279/Park.

*Distribution.* Thailand.

### 9. *Anarsia ovula* Park et Ponomarenko, sp. nov. (Figs 9, 37-41)

*Diagnosis.* The new species is similar to *A. bipinnata* (Meyrick) in the pattern of the forewing, but it can be easily separated from the latter by a large dark brown streak obliquely placed at middle of cell, and asymmetrical valvae in the male genitalia.

*Adult.* Wingspan, 17.0 mm. Head pale gray. Tegula and thorax dark brown. Labial palpus in male, 2nd segment trapezoidal, dark brown on outer surface, with orange white scales on upper 1/4, creamy white on inner surface. Antenna grayish orange with brown rings dorsally. Forewing rather broad, ground color light brown, sparsely speckled with creamy white scales; costal mark elongate, relatively small, placed beyond middle; two inconspicuous spots before it and another one beyond it; a large, dark-brown streak obliquely placed at middle of cell and the other small one at near lower angle of cell to opposite direction; apex obtuse. Venation with  $R_4$  and  $R_5$  stalked near middle,  $M_1$  running close to  $R_{4+5}$ . Male with a tuft of long hairpencil near base on under surface of forewing. Under surface of legs dark brown; hindtibia with orange white hairlike setae above. Hindwing gray, with broadly expanded costal margin to 3/5; short strong setae densely appressed along  $Rs$  to near middle; cell closed; apex rather obtuse.

*Male genitalia* (Figs 37-41). Uncus with relatively small process. Socii large, widely expanded laterocaudally, wider than distal part of tegumen. Tegumen slightly dilated beyond middle. Valvae asymmetrical, with relatively short-stalked, palmate scales bearing 7-9 lobes. Left valva oval, slightly inflated near basal part; modified scales distributed medially on distal 1/3; a narrow, long process arising

from near base of ventral margin, curved caudally, with a small rhomb-shaped plate at apex. Right valva with a small, slender membranous process near 1/4 on ventral margin, bearing numerous weak setae on medial inflated surface; palmately modified scales on quadrate distal part. Juxta incised medially into W-shaped on distal margin, connected with round lateral lobes. Vinculum relatively broad. Aedeagus S-shaped, curved at 1/4 ventrally and at 3/4 dorsally, with a rounded, flat plate at base, strongly ankylosed with juxta and vinculum at 1/4 by a small, lateral quadrate plate.

*Female genitalia.* Author unfortunately did not bring all paratypes to his laboratory (Korea) for dissection, and illustration of the female genitalia is not given here.

*Types.* Holotype: male, N Thailand, Chiang Mai, Chiang Dao, San Pakia RFD Watershed Station, 1450 m, 28. IV.-1. V. 1994 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28273/Park. Paratypes: 2 ♂, 4 ♀, ditto (I.J. Kitching & A. Cotton); 1 ♂, ditto, 15. VI. 1988 (I.J. Kitching & A. Cotton); 1 ♂, ditto, 24 km Mae Rim/Samoeng Rd., 1,100 m, 29. I. 1989 (I.J. Kitching & A. Cotton); 1 ♀, ditto, 15 km, Samoeng/Hang Dong Rd., 750 m, 3. II. 1989 (I.J. Kitching & A. Cotton); 1 ♂, ditto, Doi Suthep Pui NP, 1380 m, 22. II. 1989 (I.J. Kitching & A. Cotton); 1 ♂, Mae Hong Son, Pai Dist. Doi Mae Pui NP., 1240 m, 22. II. 1989 (I.J. Kitching & A. Cotton).

*Distribution.* Thailand.

#### 10. *Anarsia chiangmaiensis* Park et Ponomarenko, sp. nov. (Figs 10, 42-45, 64, 65)

*Diagnosis.* The new species is very similar to *A. altercata* Meyrick, which was described from Bengal, Pusa, and the following new species, *A. procera* sp. nov. in the pattern of the forewing, but it differs from them by having more distinctly developed costal mark. Generally this new species is larger than *A. altercata* Meyrick, and smaller than *A. procera* sp. nov. In the male genitalia the new species differs by the left valva: slightly inflated basally and with relatively short process, and right valva with rounded distal part.

*Adult.* Wingspan, 12.0~12.5 mm. Head and tegula pale gray. Thorax gray, darker than head. Second segment of labial palpus in female more or less triangular, dark brown at lower 2/3 and creamy white on dorsoanterior margin of outer surface broadly; 3rd slightly longer than 2nd, subbasal band relatively broad, mid and preapical band hardly divided. Forewing elongate, costal margin almost straight, ground color pale orange gray; costal mark semiovate with rounded anterior margin, reaching about 1/4 across wing; two streaks at 1/4 and 1/3 on costa, and another one at 3/4 beyond costal mark; a dark brown, short streak at middle of cell; subbasal fascia runs outwardly from basal 1/6 of dorsum, reaching about 1/2 across wing; median fascia weakly developed at mid of dorsum, very short; postmedian fascia at 2/3 of dorsum, reaching lower margin of cell. Male with a tuft of long hairpencils near base on under surface of wing. Venation  $R_4$  and  $R_5$  shortly stalked,  $M_1$  very close to  $R_{4+5}$ ,  $M_2$  connate with  $M_3$  at base. Hindwing gray, expansion of costa extended beyond middle;  $CuA_1$  arising from lower corner of cell.

*Male genitalia* (Figs 42-45). Uncus with a relatively short, broad median process. Width of socii wider than distal part of tegumen, stretched laterocaudally. Tegumen dilated towards base. Valvae asymmetrical, with common modified scales bearing 8~12 lobes; apex of valvae exceeding that of uncus. Left valva slightly inflated in basal part, bearing setae; with a narrow, curved, relatively short process arising before inflated part, curved caudally; a large membranous sac arising from ventral margin medially. Right valva

dilated in distal part, with a weakly sclerotized, short ventral process near base. Aedeagus relatively short, curved ventrally at basal 1/6 and at 4/6, distal part forming relatively wide plate. Vinculum relatively broad.

*Female genitalia* (Figs 64, 65). Membrane between 8th and 9th segments as long as 1/5 of papillae anales. Papillae anales weakly sclerotized. Apophyses posteriores slightly longer than papillae anales. Apophyses anteriores extremely short, less than 1/10 length of apophyses posteriores. Sclerotized part of 8th tergite deeply incurved distally, with heavily sclerotized, pocket-shaped cavity at middle. Posterior margin of 8th sternite with rounded plate protruded caudally. Seventh segment with a triangular sclerite on posterior margin, with a membranous small sac connected to its apex. Ostium placed before posterior margin of 8th sternite, wide and rounded. Antrum dilated distally, slightly sclerotized. Ductus bursae narrow, membranous, shorter than 1/3 length of corpus bursae. Corpus bursae large, membranous, with rhomb-like signum.

*Types.* Holotype: male, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1380 m, 6. II. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28274/Park. Paratype: 1 ♀, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1460 m, 4. II. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28275/Park.

*Distribution.* Thailand.

### 11. *Anarsia procera* Park et Ponomarenko, sp. nov. (Figs 11, 46-50)

*Diagnosis.* The new species is similar to *A. chiangmaiensis* sp. nov. in the pattern of the forewing, but it is much larger than the latter. It is easily differentiated by the male genitalia. Male genitalia are also similar to that of *A. altercata* Meyrick, but differs from it by the right valva: distal part round, without an inflation beyond middle part, and narrower aedeagus.

*Adult.* Wingspan, 16.0 mm. Head pale orange white, shining, suffused with brown. Thorax concolorous, speckling with dark brown scales. Second segment of labial palpus in male triangular, brown on outer surface, dorsoanterior margin creamy white broadly, speckling with brown scales; dark brown on inner surface, paler towards base. Forewing elongate, costal margin slightly arched before middle and then straight; ground colour creamy white, suffused with brown scales irregularly; costal mark small, dark brown; two triangular streaks on costal margin between base to costal mark; a small dark brown streak on R-vein near base; relatively a large streak placed at middle of cell, sometimes divided into two parts; subbasal fascia weakly developed from near basal 1/6 on dorsum, runs outwardly, reaching near middle across wing, followed by a small streak; median fascia forms a spot on dorsum; two small, longitudinal streaks along margin around tornus; apex relatively acute. Venation of forewing unusual among related species, M<sub>1</sub> stalked with R<sub>5</sub>, R<sub>4</sub> and R<sub>5</sub> stalked. Male with a tuft of long hairpencils under surface of forewing. Hindwing gray, expansion of costa developed to middle; M<sub>2</sub> far from M<sub>3</sub> at base; CuA<sub>1</sub> arising from lower corner cell. Female is unknown.

*Male genitalia* (Figs 46-50). Uncus short, with a hook-like process, broadened at base, almost 1/3 width of socii. Socii stretched laterocaudally, distal margin between both sides gently emarginated. Tegumen elongated, dilated beyond mid and 3/4 distally. Valvae asymmetrical, with palmately modified scales on distal margin, bearing 7-9 lobes. Left valva dilated basally, narrowed at middle with a large membranous sack before middle; S-shaped process slender, longer than valva, arising from ventral corner

of base. Right valvae simple, lacking process, dilated at base, narrow at middle, and broader towards apex. Aedeagus narrow, S-shaped, curved ventrally near base and dorsally before apex, heavily ankylosed with juxta and vinculum near base by a ventral triangular plate. Vinculum relatively broad.

*Types.* Holotype: male, NW Thailand, Chiang Mai, Doi Suthep-Pui NP, 1460 m, 26. I. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28276/Park. Paratype: 1 ♂, ditto, 4. II. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28272.

*Distribution.* Thailand.

### 12. *Anarsia conica* Park et Ponomarenko, sp. nov. (Figs 12, 54-57)

*Diagnosis.* The new species is very close to *A. patulella* (Walker) superficially, but it can be distinguished from the latter by the smaller discal spot on the forewing and characters of the male genitalia.

*Adult.* Wingspan 10.0~10.5 mm. Head and tegula pale gray. Antenna with well developed dark brown rings dorsally. Second segment of labial palpus subtrapezoidal, brown on outer surface, dorsoanterior margin yellowish orange broadly; inner surface creamy white, dark brown along ventral margin. Forewing extremely elongate, ground colour pale orange-gray, speckling with dark gray scales irregularly; costal margin straight; costal mark elongate, preceeded by 3 small, obscure streaks along margin and followed by 2 streaks; discal streak obscure; apex surrounded by relatively long cilia; R<sub>4</sub> and R<sub>5</sub> stalked beyond middle; M<sub>1</sub> closer to R<sub>4+5</sub> towards base. Male lacking a tuft of long hairpencils on under surface of forewings. Hindwing pale gray; expansion of costa relatively short, extending to about 2/5; termen extremely oblique; apex acute. Female is unknown.

*Male genitalia* (Figs 54-57). Uncus hook-shaped, relatively long, curved ventrally. Socii small, width narrower than distal part of tegumen, slightly expanded laterally. Tegumen dilated at base, narrower distally. Valvae asymmetrical, weakly sclerotized, with long stalked palmate scales bearing 10-14 lobes, both with conic apexes. Left valva wider, longer than right one, with a small lobe on medial surface; a narrow, strongly curved process arising from base ventrally. Right valva with almost straight costa, with trapezoidal plate-like lobe at 1/3 of ventral margin; lacking a process. Aedeagus narrower towards apex, curved at right angle near half, with rounded flat plate at basal zone, ankylosing with juxta and vinculum by a rectangular plate at 1/4. Vinculum narrow.

*Type.* Holotype: male, N Thailand, Chiang Mai, Doi Suthep-Pui NP, 1490 m, 24. V. 1989 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28277/Park.

*Distribution.* Thailand.

### 13. *Anarsia meiosis* Park et Ponomarenko, sp. nov. (Figs 13, 58-61)

*Diagnosis.* In the pattern of the forewing and the male genitalia, the new species is also close to *A. patulella* (Walker) and the preceding new species, *A. conica* sp. nov., but it can be distinguished from the latter by the not elongated forewings and its pale orange ground colour. Male genitalia are also separable from them by the shape of valvae and aedeagus.

*Adult.* Wingspan 11.0 mm. Head and thorax pale orange. Antenna pale orange, rings weakly developed. Second segment of labial palpus trapezoidal; dorsoanterior margin light orange broadly and

dark brown on outer surface; inner margin creamy white centrally, light brown on dorsal margin and dark brown on ventral margin, with black scales anteriorly. Forewing moderate, not elongate; ground colour pale orange, yellowish brown and dark brown scales spread beyond 3/5 of wing; costa slightly arched before middle; costal mark elongate, preceded by two and followed by a dark brown streak on margin; a small spot upper R-vein near base; discal streak dark brown, well developed; a distinct small streak near tornus.  $R_4$  and  $R_5$  stalked near middle,  $M_1$  closer to  $R_{4+5}$  towards base. Male lacking a tuft of hair pencils on under surface of forewings. Hindwing pale gray; expansion of costa extended to 2/5; termen sinuate, strongly oblique; apex acute. Female is unknown.

*Male genitalia* (Figs 57-60). Uncus with a relatively short median process, slightly curved ventrally; socii slightly expanded laterally, its width as wide as distal part of tegumen. Tegumen with lateral margins almost parallel. Valvae asymmetrical, both narrower towards apex, with long stalked palmate scales bearing 14-16 lobes; apex of valvae much more exceeding that of uncus. Left valva evenly narrowed towards apex, with a narrow, curved process ventrally. Right valva with conic apex, lacking process. Juxta with two short lobes bearing small setae densely. Vinculum narrow. Aedeagus gently arched, strongly ankylosing with juxta and vinculum by two small triangular plates near basal at 1/4.

*Types.* Holotype: male, Thailand, Trang, Trang to Phattalung Rd., 120 m, 8. VIII. 1990 (I.J. Kitching & A. Cotton), gen. prep. no. BM-28278/Park. Paratype: 1 ♂, ditto, 8. VIII. 1990 (I.J. Kitching & A. Cotton).

*Distribution.* Thailand.

#### 14. *Anarsia leuwanichae* Park et Ponomarenko, sp. nov. (Figs 15, 53)

*Diagnosis.* The new species, *A. leuwanichae* sp. nov. is also similar to *A. isogona* Meyrick in the pattern of the forewings, but it can be distinguished by the broader forewing and larger costal mark. Female genitalia are also separable: 8th sternite convexed anteriorly at medial part, goblet-like form of antrum, narrow and elongated corpus bursae; and lacking membranous pouch arising from anterior margin of 8th sternite.

*Adult.* Wingspan 10.5 mm. Head, tegula, and thorax yellowish white; tegula covered with dark black scales on anterior margin. Antenna yellowish white, dark brown rings darker before basal 1/4. Second segment of labial palpus in female more or less trapezoidal, relatively large, with erected creamy-white scales on dorsoanterior margin of outer surface; 3rd segment slightly longer than 2nd, subbasal band weakly developed, mid and preapical bands completely connected into one, apical portion creamy white. Forewing relatively broad, ground color yellowish white speckling with brown scales irregular; costa almost straight; costal mark large, dark brown, triangular, but lower apex not sharpened, reaching lower margin of cell; a small dark brown streak clearly presented beyond costal mark, but weakly developed one before it; apex obtuse. Venation  $R_4$  and  $R_5$  stalked near middle,  $M_1$  relatively far from  $R_{4+5}$  at base,  $M_2$  almost parallel to  $M_1$ . Hindwing gray,  $M_1$  arising from beyond cell,  $M_2$  close to  $M_3$  at base,  $CuA_1$  arising near lower angle of cell; apex relatively obtuse. Male is unknown.

*Female genitalia* (Fig. 53). Papillae anales membranous. Apophyses posteriores longer than length of papillae anales. Apophyses anteriores extremely short, as small knobs. Eighth tergite with heavily sclerotized pocket-shaped cavity medially near posterior margin. Eighth sternite with strongly sinuated

anterior margin. Ostium placed almost at middle of 8th sternite. Antrum goblet-like, heavily sclerotized. Ductus bursae membranous, narrow, and short, less than 1/3 length of corpus bursae. Corpus bursae membranous, oblong; lacking signum.

*Type.* Holotype: female, S Thailand, Khao-Yai, 20-24. VIII. 1990 (K.T. Park et A. Lewvanich), gen. prep. no. CIS-4242/Park.

*Distribution.* Thailand.

*Etymology.* This species is named after Dr. Angoon Lewvanich, Microepidopterist, in the Entomology and Zoology Division, Department of Agricaltung, Bangkok, Thailand.

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## 태국産 *Anarsia*屬(나비目, 뿔나방科)의 분류학적 정리

朴 奎 澤, M. G. PONOMARENKO

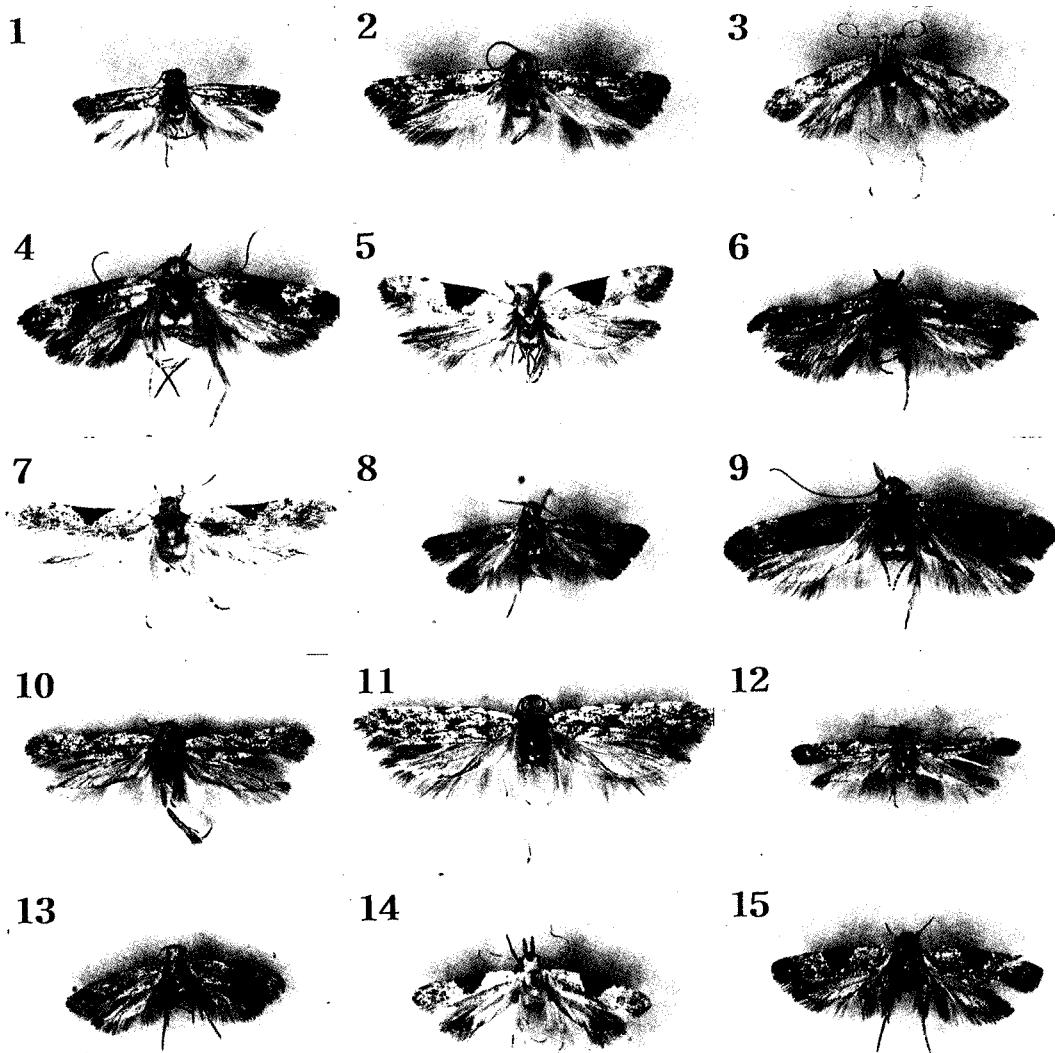
강원대학교 농업생명과학대학

泰國產 *Anarsia*屬을 분류정정한 결과 8種의 新種과 6 未記錄種 등 14種이 확인되었으며, 8種의 新種은 *spatulatana* sp. nov., *paraisogona* sp. nov., *ovula* sp. nov., *chiangmaiensis* sp. nov., *procera* sp. nov., *conica* sp. nov., *meiosis* sp. nov., and *leuwanichae* sp. nov. 등으로 命名되었다. 금번의 연구대상 표본들은 대부분이 최근 (1988~1994) 태국에서 채집, 大英박물관 (The Natural History Museum)에 보관되어 있는 표본들이며, 일부는 필자에 의해 (1990) 채집되었던 표본들이 포함되었다. 新種들의 기재와 함께 14種의 숫컷생식기에 의한 검색표와 全種에 대한 암수생식기를 도해하였다.

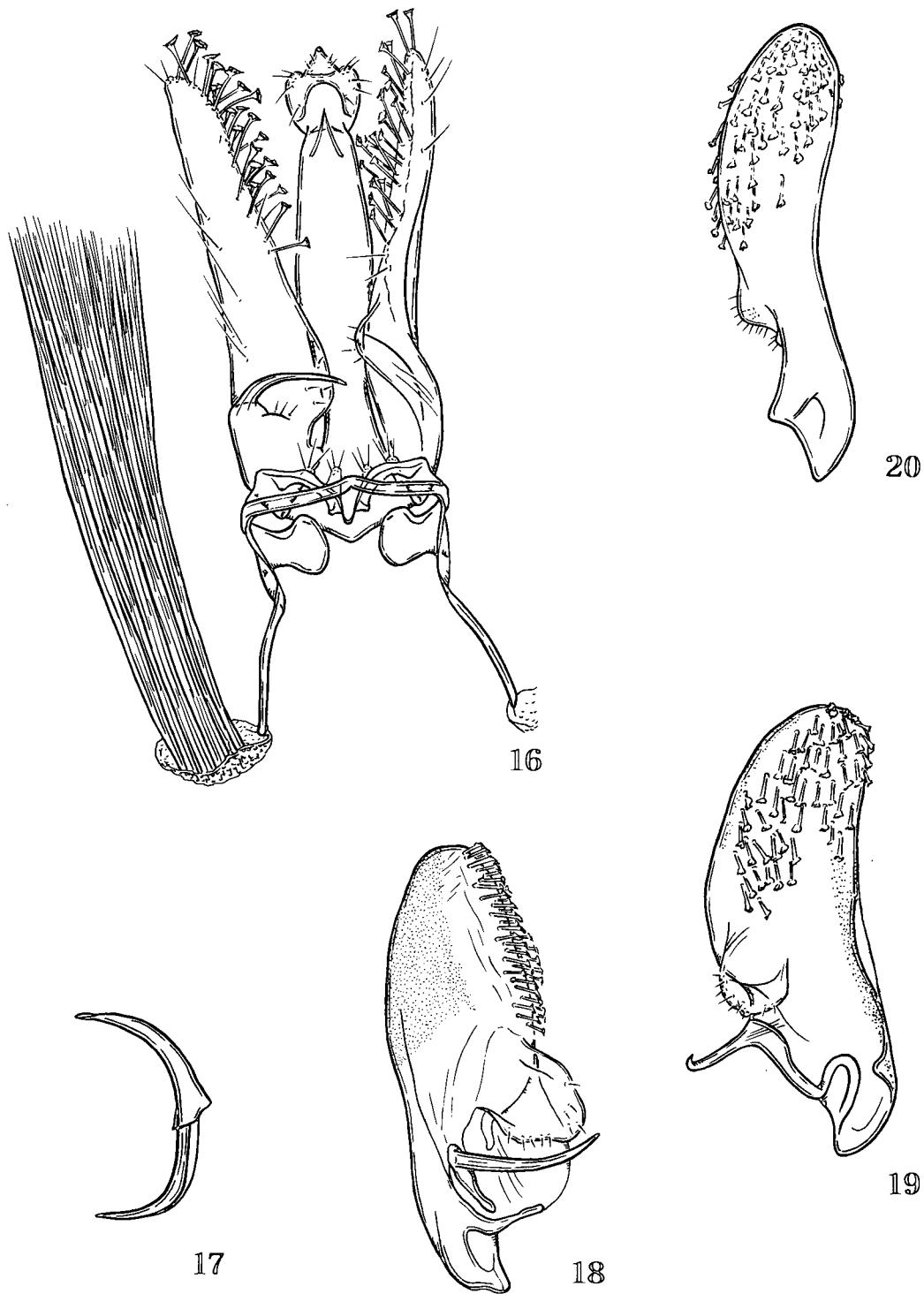
검색어 : 분류, 나비목, 뿔나방科, *Anarsia*, 태국

(Received: 20 June 1996)

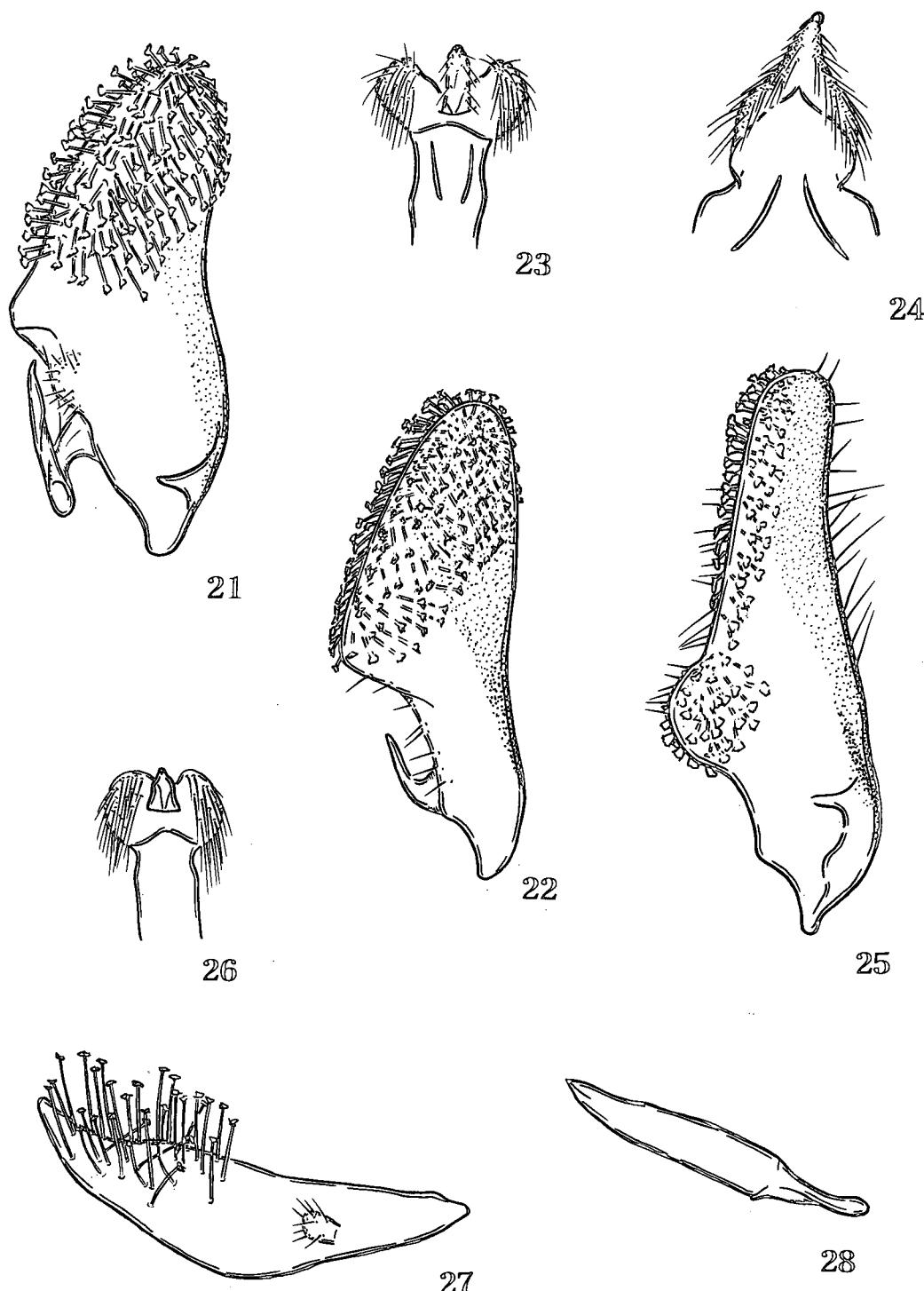
(Accepted: 15 August 1996)



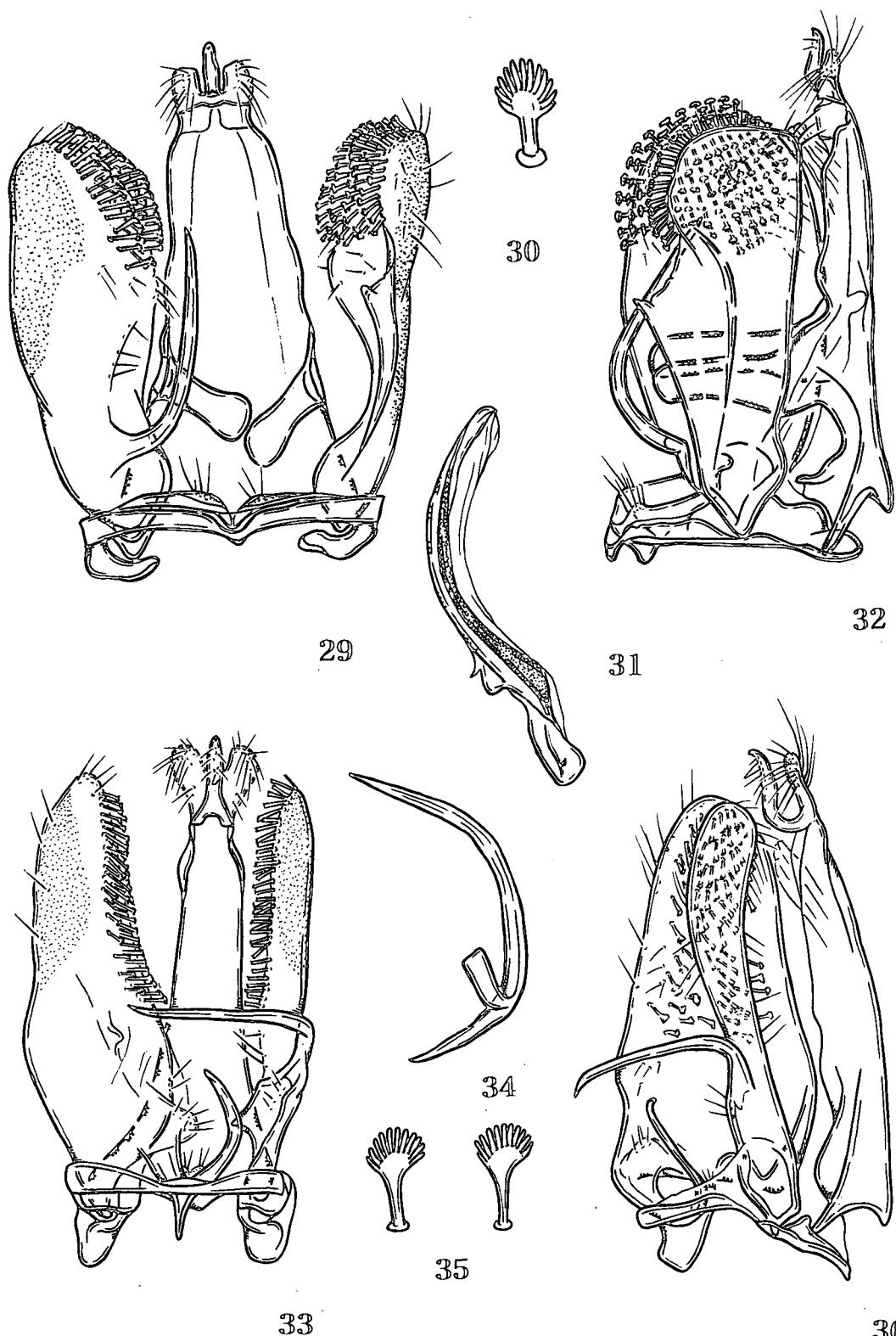
**Figs 1-15.** adult: 1. *A. didymopa* Meyrick; 2. *A. elongata* Park; 3. *A. patulella* (Walker); 4. *A. phortica* Meyrick; 5. *A. tricornis* Meyrick; 6. *A. spatulatana* sp. nov., male; 7, ditto, female; 8. *A. paraisogona* sp. nov.; 9. *A. ovula* sp. nov.; 10. *A. chiangmaiensis* sp. nov.; 11. *A. procera* sp. nov.; 12. *A. conica* sp. nov.; 13. *A. meiosis* sp. nov.; 14. *Anarsia* sp., unnamed; 15. *A. lewvanichae* sp. nov.



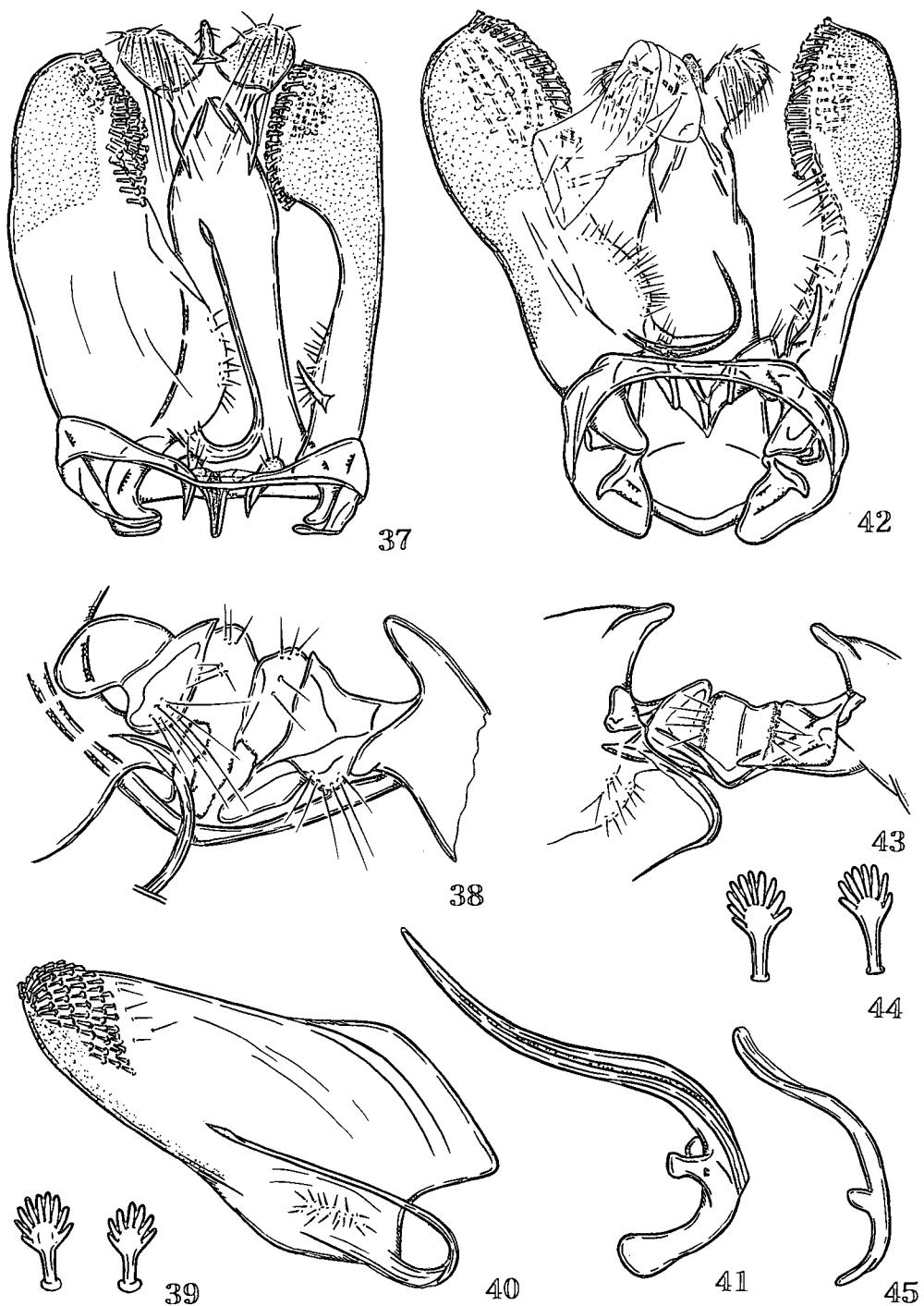
**Figs 16-20.** Male genitalia : 16. *A. didymopa* Meyrick, ventral view; 17. ditto, aedeagus; 18. *A. elongata* Park, left valva, ventral view; 19. ditto, left valva, lateral view; 20. ditto, right valva.



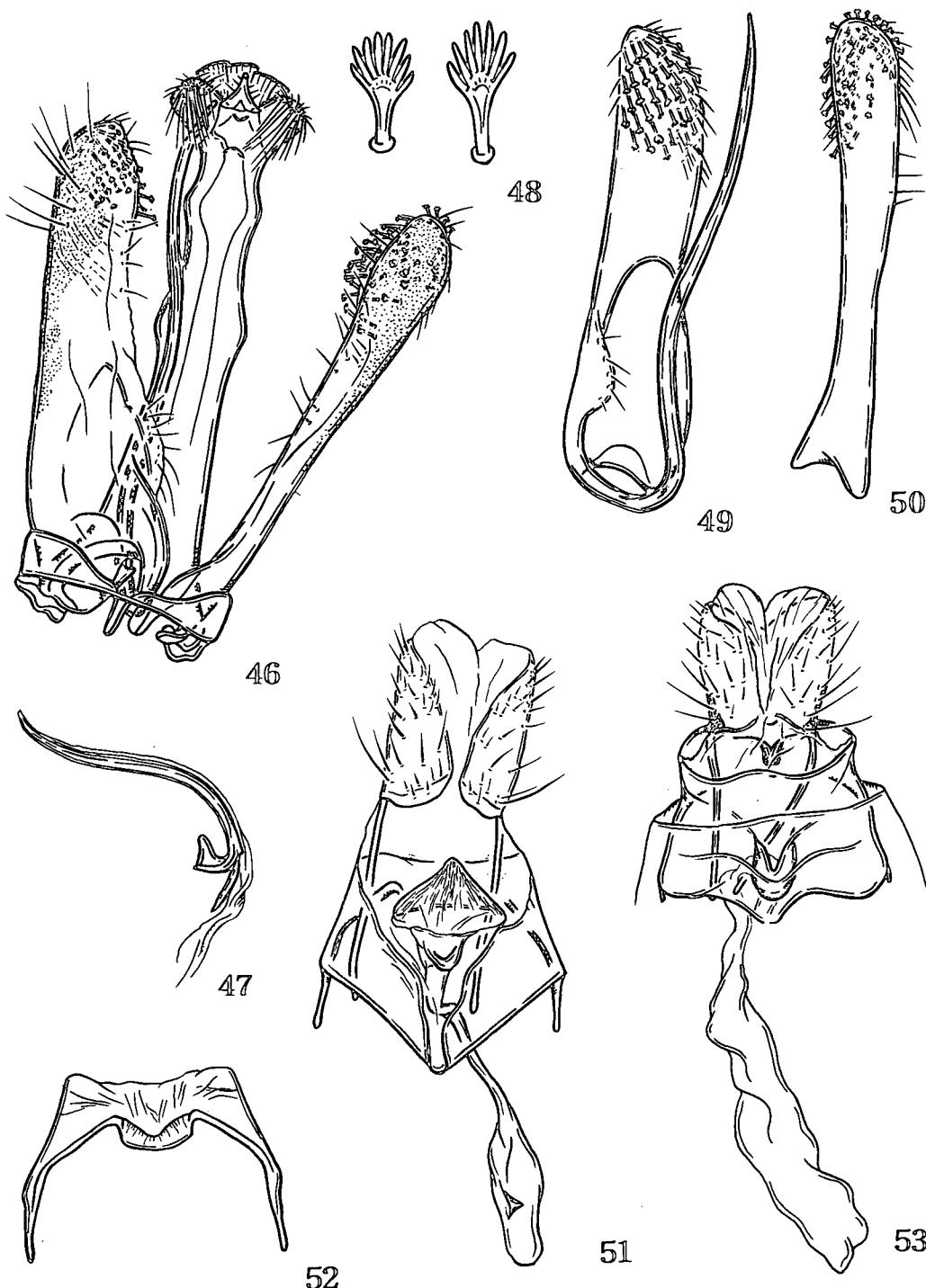
**Figs 21-28.** Male genitalia : 21. *A. tricornis* Meyrick, left valva; 22. ditto right valva; 23. uncus, socii, distal part of tegumen; 24. *A. phortica* Meyrick, uncus, socii, distal part of tegumen; 25. ditto, right valva; 26. *A. patulella* (Walker), uncus, socii, distal part of tegumen; 27. ditto, left valva; 28. ditto, aedeagus.



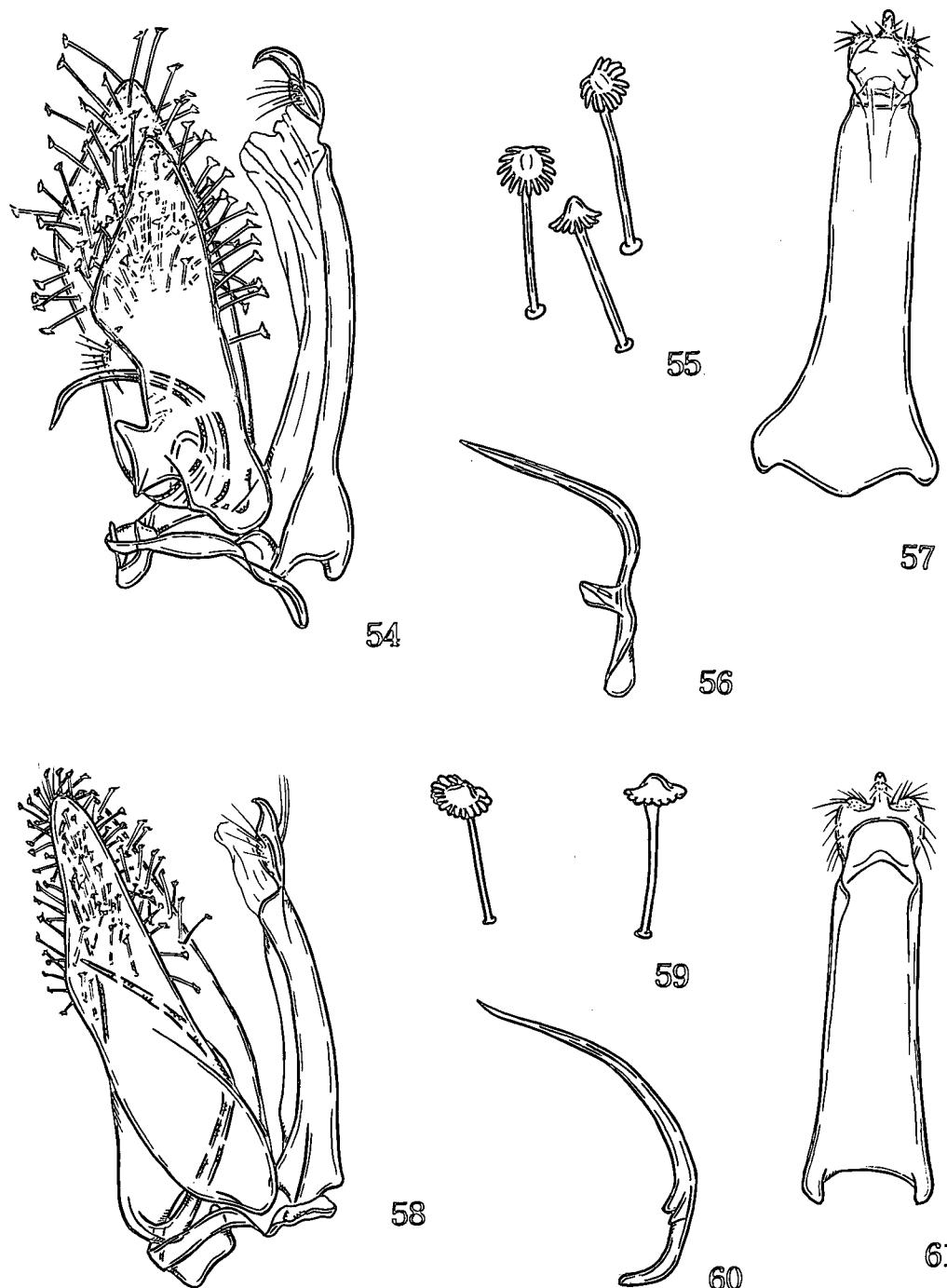
**Figs 29-36.** Male genitalia : 29. *A. spatulatana* sp. nov., ventral view; 30. ditto, modified scales; 31. ditto, aedeagus; 32. ditto, lateral view; 33. *A. paraisogona* sp. nov., ventral view; 34. ditto, aedeagus; 35. ditto, modified scales; 36. ditto, lateral view.



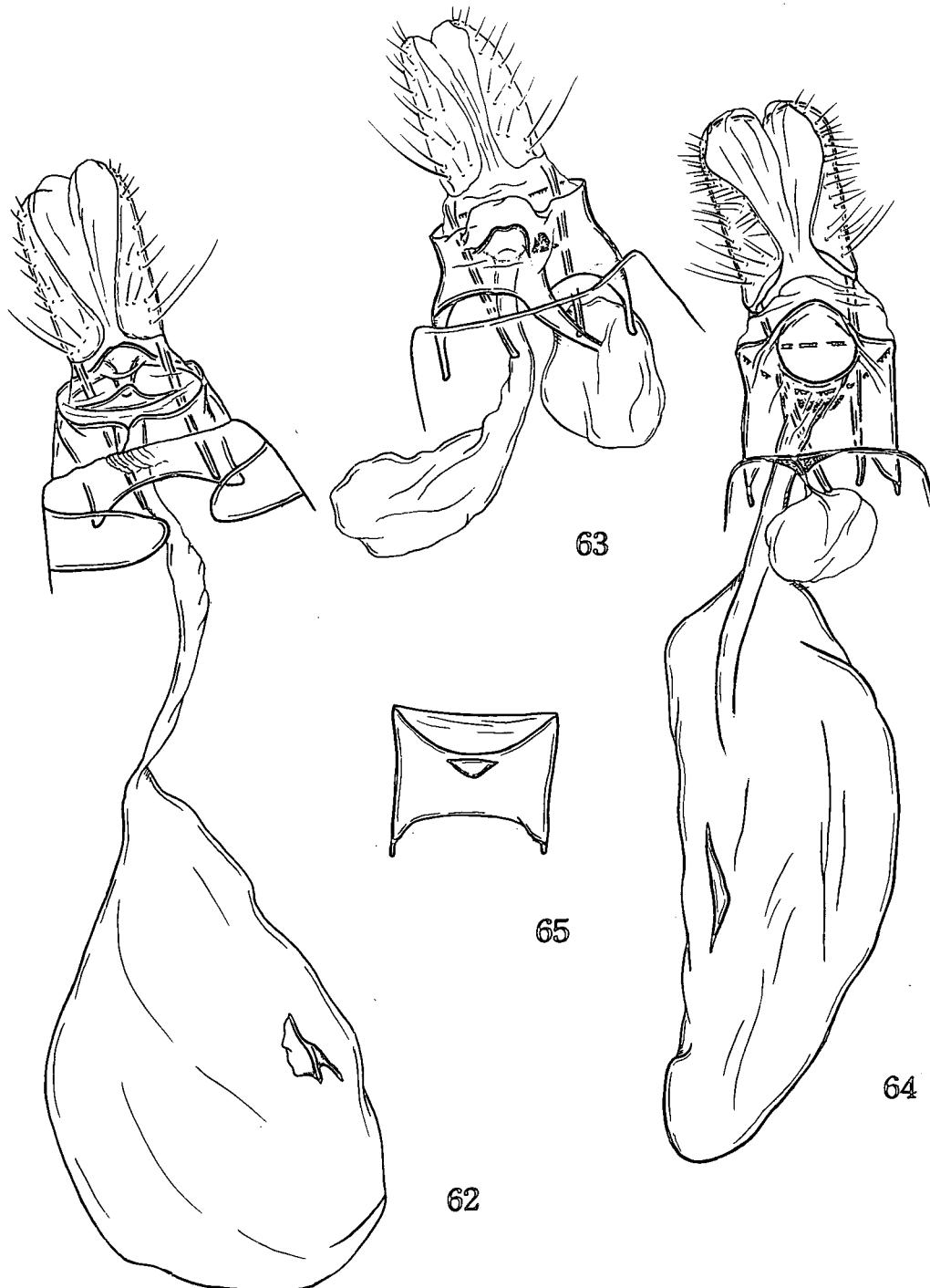
**Figs 37-45.** Male genitalia : 37. *A. ovula* sp. nov., ventral view; 38. ditto, juxta, basal part of valvae, ventral part of vinculum; 39. ditto, modified scales; 40. ditto, left valva; 41. ditto, aedeagus; 42. *A. chiangmaiensis* sp. nov., ventral view; 43. ditto, juxta, basal part of valvae, ventral part of vinculum; 44. ditto, modified scales; 45. ditto, aedeagus.



**Figs 46-53.** Male and female genitalia : 46. *A. procera* sp. nov., male genitalia, ventral view; 47. ditto, aedeagus; 48. ditto, modified scales; 49. ditto, left valva; 50. ditto, right valva; 51. *Anarsia* sp., unnamed, female genitalia; 52. ditto, 8th tergite; 53. *A. lewvanichae* sp. nov., female genitalia.



**Figs 54-61.** Male genitalia : 54. *A. conica* sp. nov., lateral view; 55. ditto, modified scales; 56. ditto, aedeagus; 57, ditto, uncus, socii, tegumen; 58. *A. meiosis* sp. nov., lateral view; 59. ditto, modified scales; 60. ditto, aedeagus; 61. ditto, uncus, socii, tegumen.



Figs 62-65. Female genitalia : 62. *A. paraisogona* sp. nov.; 63. *A. spatulatana* sp. nov.; 64. *A. chiangmaiensis* sp. nov.; 65. ditto, 8th tergite.